AMENDMENTS TO THE SPECIFICATION

Page 1, after the title, add the following:

CROSS-REFERENCE TO RELATED APPLICATION

The present application is a continuation application of United States Patent Application No. 10/082,288, filed on February 26, 2002, the disclosure of which is incorporated by reference herein.

Page 6, lines 12-18:

A one-stage deflection coil 51 (an aligner for the objective lens) is disposed in the vicinity of the scanning coil 9 or at the same position thereof and operates as the aligner for the objective lens. An octupole astigmatism correction coil 52 (astigmatism corrector) for correction of astigmatism in the X and Y-directions is disposed between the objective lens and the diaphragm plate. An aligner 53 for correcting an axis deviation of the astigmatism correction coil is disposed in the vicinity of the astigmatism coil or at the same position thereof.

Page 8, lines 11-13:

The condition of the aligner ~~1~~ 51 is kept intact, and only the objective lens condition is set to second focus condition in which a focus deviates from the objective lens condition 1 by a value previously determined, thus obtaining an image 2.

Page 12, lines 6-26:

~~Specifically, a formula of n-degree having the unknowns such as A and B is solved under the condition that the parallax ΔWi, which is obtained when the aligner is set to the arbitrary two conditions previously determined, becomes small (ideally zero), whereby a condition can be deduced which does not depend on the operation condition of the electron optical system.~~ Specifically, the unknowns A and B are calculated from the equation including A and B before calculating the aligner condition that makes the parallax ΔWi small (ideally zero) when the objective lens is set to the predetermined two conditions. The aligner condition, that is, an excitation condition of the aligner, can be deduced based on this condition. Note that the aligner 51 has an arrangement or a structure which is capable of controlling a beam passage position two-dimensionally at least in a main plane of the objective lens. This is because if a deflection fulcrum of the beam by the aligner exists in the vicinity of the main plane of the objective lens, a state of the axis deviation relative to the objective lens cannot be controlled. Specifically, in the case of the alignment deflector (aligner) using the electromagnetic coil like this embodiment of the present invention, it is possible to detect an excitation current (deflection signal) supplied to the coil, which changes depending on an optical condition. For example, since the excitation current, which changes depending on a change of an excitation condition of the objective lens and depending on a level of a retarding voltage applied to the sample, can be detected based on the optical conditions in observation, it is unnecessary to register parameters different for each optical condition previously. Even if a condition of the beam changes by a change due to the passage of time, an excitation current supplied to a proper alignment coil in the state where the beam condition changes can be detected.

Page 16, line 25 through page 17, line 23:

Fig. 7 is a drawing for explaining a third embodiment of the present invention, which shows a setting screen for setting environments for an automatic axis deviation correction displayed in an image display device. An operator of a scanning electron microscope sets the environments of the automatic axis alignment based on this screen. In the case of this embodiment, an example in which the environments are set by use of a pointing device 60 on the setting screen will be described. First, the operator decides whether an aperture alignment is executed automatically, and selects any one of "Correction Based On Parallax Detection", "Previously Determined Value Correction" and "No Correction". "Correction Based On Parallax Detection" is a mode in which the axis deviation correction is executed in the steps described in Embodiment 1. If this mode is selected, axis correction precision, which is stable for a long time regardless of a change of a primary electron beam due to the passage of time, can be acquired. "Previously Determined Value Correction" is a mode in which an ~~exciting~~ existing condition of an objective lens and an axis deviation caused for each of distances between a sample and the objective lens, which are a plurality of optical conditions such as a working distance, are previously registered in a memory (not shown), and an axis alignment is performed under the registered axis alignment condition when a predetermined optical condition is set. This mode should be selected, for example, when no change of the axis deviation depending on the passage of time occurs and when approximately the same axis deviation is recognized regardless of the change of the optical condition. Since in this setting the correction is performed based on the previously determined value, a detection of the axis alignment condition and a calculation time are not needed, and hence shortening of the processing time is possible. "No Correction" is a mode in which the axis alignment is not performed, and this mode should be selected under an environment where the axis deviation does not occur.

Page 18, lines 1-16:

Next, the operator selects an automatic axis alignment timing. With regard to this selection, for example, when a frequency of occurrence of the axis deviation is high, "Every Analysis Point" is set in consideration for precision of the axis alignment, and the axis deviation correction is performed for each measurement point. When the axis deviation does not occur so frequently, "Every Wafer" is selected in consideration for throughput, and the axis deviation correction should be performed every time when a wafer to be measured by the scanning electron microscope is replaced with another. By providing such a ~~chance~~ choice of selections, it is possible to select a proper timing of the axis deviation correction based on the usage condition and the environment of the scanning electron microscope. Furthermore, when "When Parallax Exceed Predetermined Value" is selected, the parallax ΔWi for the objective lens current change amount ΔI is detected for each analysis point or each wafer. When the parallax ΔWi exceeds the predetermined value, "Correction Based On Parallax Detection" is performed. In addition, when "User Setting" is selected, the axis alignment is performed at an axis alignment timing separately registered in advance.

Page 19, line 5 through page 20, line 8:

The graph shown in Fig. 8(b) is an example in which measurement results for semiconductor pattern widths are displayed so as to be superimposed on the correction amount graph of Fig. 8(a). The measurement of the semiconductor pattern widths is performed by measuring the width of a line profile formed based on a detection amount of secondary electrons and reflected electrons, which are obtained by scanning an electron beam one-dimensionally or two-dimensionally on a semiconductor device on which a pattern to be ~~measure~~ measured is formed. The measurement results of the

pattern to be measured obtained in the above described manner and errors of pattern dimensions based on design information are plotted so as to be superimposed on the correction amount graph shown in Fig. 8(a).

In Fig. 8(b), the symbol "A" indicates a point where the measurement was performed under the condition that "Correction Based On Parallax Detection" is not performed because the parallax ΔWi exceeds a certain determined range or because there is no structural information necessary for the parallax detection (in the case where the quantization value Fi described in Embodiment 2 is equal to a value or less or lower than this value). In order to make it possible to distinguish this portion from a portion where the correction amount is zero, this portion should be displayed in such a manner that this portion is distinguished from other portions by displaying this portion with a different color. In the following descriptions, when the parallax ΔWi exceeds a predetermined range, descriptions for the case where the measurement is executed without performing "Correction Based On Parallax Detection" will be made. However, the way of the measurement is not limited to this, and an alarm to urge the operator to perform the axis alignment or the like may be issued so that the operator stops the automatic measurement. Note that when the measurement is continued in spite of the fact that "Correction Based On Parallax Detection" is not performed, the obtained measurement value may be erroneous. In such a case, in order to confirm with eyes later whether the measurement was properly performed, at least one of the sample ~~image~~ images obtained in the measurement, the line profile and the optical condition of the electron microscope should be memorized together with the measurement value. The operator can judge reliability of the measurement by checking these information against the obtained measurement results.

Page 21, line 24 through page 22, line 3:

Figs. 9 and 10 are flowcharts for explaining the embodiment, and the flowcharts are executed according to a program previously stored in a storage device 41 and a command input from ~~then~~ the input device 42. The flowchart shown in Fig. 9 differs from the flowcharts shown in Figs. 2 and 4 in that while the technique of the axis alignment is unchanged to the flowcharts shown in Figs. 2 and 4, the technique of the axis alignment changes in accordance with the states of affairs in the flowchart shown in Fig. 9.

Page 24, line 19 through page 25, line 4:

First, the image 1 is subjected to a differentiation by a differentiation filter, and a threshold is set so that an edge is left. Thus, a binary screen is prepared. This binary screen undergoes a segment processing, and only an edge forming a pattern is extracted. The center of gravity (x1, y1) of the pattern is calculated based on the edge information extracted. The same processing is performed for the image 2, and the center of gravity (x2, y2) of the pattern is calculated. The deviation amount to be found becomes equal to W(x2 - x1, y2 - y1). Even if a pattern having a circular shape originally is detected to be elliptical by changing an electron optical condition, this technique shows a merit that this technique is tough against a change in shape of the pattern because the position of the center of gravity of the pattern hardly ~~change~~ changes.